INFLUENCES OF ACHIEVEMENT MOTIVATION AND APTITUDE ON LEARNING
ELEMENTARY ACCOUNTING THROUGH INDIVIDUALIZED SELF-PACED AND
TRADITIONAL INSTRUCTIONAL METHODS

BY

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The purpose of this study was to predict the success of elementary

accounting students enrolled in individualized self-paced instruction

classes and those enrolled in traditional instruction classes based on

their motivation and aptitude. Two hundred and fifty students enrolled in

elementary accounting at Clark County Community College, Las Vegas,

Nevada, during the fall of 1979 were identified for use in this study.

One hundred elementary accounting students were in the individualized

self-paced class and one hundred and fifty students were in the traditional

classes. The study also investigated the relationship between students'

age, sex, college grade point average, business courses previously

taken, work experience in business, and their aptitude and motivation for

learning elementary accounting and achievement in elementary accounting.

The American Institute of Certified Public Accountants Orientation Test

was used to determine students' aptitude in elementary accounting and

the Mehrabian Measures of Achieving Tendency was used to determine

students' achievement motivation. The American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, was used to measure students' achievement in elementary accounting.

There was no significant difference between the aptitude scores, achievement motivation scores, sex, college grade point average, business courses previously taken on the college level, or work experience in business of those students enrolled in the individualized self-paced accounting laboratory class (Method One) and those enrolled in traditional classes (Method Two). However, students enrolled in the self-paced accounting laboratory class were significantly older than those students enrolled in the traditional classes.

A significant relationship was found between students' achievement in elementary accounting and students' aptitude scores. A significant relationship was also found between students' aptitude and students' achievement motivation scores. Those students with low motivation and low aptitude scores, high aptitude and low motivation scores, and low aptitude and high motivation scores had difficulty completing the elementary accounting course in the individualized self-paced accounting laboratory class. Of the 17 students completing the elementary individualized self-paced accounting course, 16 scored high on both motivation and aptitude; however, there was no significant difference between the achievement scores of these 16 and 16 students randomly selected from the traditional classes who scored high on both motivation and aptitude.

No significant relationship was found between achievement and achievement motivation. Aptitude was found to be the best single predictor of students' completing the elementary accounting course.

CHAPTER I

INTRODUCTION

The use of individualized instruction in the teaching of accounting has been studied extensively. These studies have established beyond reasonable doubt that students do, indeed, learn from individualized instruction. One method of individualized instruction which is currently being used in accounting instruction is the individualized self-paced method. This method of instruction is geared to the learning pace of the students by allowing them to progress through a course at their own pace.

The research on individualized self-paced instruction has indicated that it is an effective method of instruction (Reiser and Sullivan, 1977; Born, 1973). However, studies have also indicated that there is often a high withdrawal rate in individualized self-paced instruction classes. Reiser and Sullivan (1977) reported that the number of students who withdrew from a political science course was significantly higher in the individualized self-paced class than in the traditional instructor-paced class. Powers and Edwards (1974) also reported high withdrawal rates in classes taught by the individualized self-paced instruction method. One plausible interpretation of these findings is that individualized self-paced instruction suits some but not all students.

Need for the Study

The research on methods of instruction in elementary accounting sheds no light on the type of method that is best for each student. Research has also not shown what influences students' success in accounting. There is a need for research to investigate the influences of achievement motivation and aptitude on students' achievement and to determine if prognosis on students' aptitude and motivation can be used as a valid prediction of students' success in elementary accounting.

Statement of the Problem

The problem of this study, the high withdrawal rate of students studying elementary accounting in individualized self-paced accounting laboratories, has been documented in previous research. The purpose of this study was to determine whether motivation and aptitude test scores could be used to select students who could successfully complete an individualized self-paced accounting laboratory course. The study investigated the influences of achievement motivation and aptitude on the achievement of elementary accounting students taught using two different methods. The study compared the achievement of students in an individualized self-paced laboratory class (Method One) with the achievement of students in traditional classes (Method Two). The study was designed to determine the effect of aptitude and achievement motivation on achievement in classes in which the two methods were used. The relationship between students' age, sex, college grade point average, business courses previously taken on the college level, work experience in business, students' achievement in elementary accounting, and their aptitude and motivation for learning elementary accounting was investigated.

Delimitations

While aptitude, achievement motivation, age, sex, college grade point average, work experience in business, and courses in business previously taken on the college level could be influences on students' achievement in elementary accounting, it is recognized that there were other variables which could also influence student achievement. Only those variables listed above were studied in this investigation.

Students involved in the study were permitted to enroll in either the individualized self-paced accounting laboratory class (Method One) or the traditional classes (Method Two). No attempt was made to randomly assign the students.

Paper and pencil type tests have limitations in measuring students' achievement motivation and aptitude. These limitations are acknowledged.

Treatment Variables

Individualized Self-Paced Instruction (Method One). This is a method of accounting instruction individualized and geared to the learning pace of the student through the use of textbook reading assignments (Accounting Principles by Niswonger and Fess, 1977), commercial materials, ALEX* (Accounting: A Learning Experience, 1973), and an individualized course outline.** Students enrolled in the individualized self-paced accounting

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*The commercial materials is a multimedia instructional package which incorporates audio-cassettes and filmstrips.

**The individualized course outline is a self-paced instructional unit designed by the researcher and accounting instructors at Clark County Community College for the individualized self-paced accounting laboratory class (Method One). The outline contains the following: 1) objectives for each of the textbook chapters; 2) textbook reading assignments (Accounting Principles); 3) ALEX modules assignments; and 4) assigned textbook problems (Accounting Principles).

laboratory class are required to read the assigned chapters in the textbook, Accounting Principles, and to do assigned problems at the end of each chapter. In addition, each student is required to attend the accounting laboratory class on an independent study basis and to view the ALEX modules which have been correlated with the textbook reading assignments. This method involves no formal group instruction. An instructor is available in the self-paced laboratory class to assist students and also to administer tests.

Traditional Instruction (Method Two). This is a method of accounting instruction which includes classroom lectures, group discussions, and textbook reading assignments (Accounting Principles by Niswonger and Fess, 1977). Students enrolled in the traditional classes are required to read assigned chapters in the textbook, to view ALEX modules, and to do the problems at the end of the chapter. During regularly scheduled classes instruction is given to the students which covers the assigned textbook chapters and problems. Students are required to attend classes.

Instruments Used in the Study

The Mehrabian Measures of Achieving Tendency (Mehrabian and Bank, 1978) was administered to all students enrolled in the individualized self-paced accounting laboratory class (Method One) and to all students enrolled in the traditional classes (Method Two) during the first class meeting (Fall Semester, 1979). The purpose of this instrument was to determine the motivation level of the student. The instrument is designed to discriminate high achievement motivation students (individuals whose motive to achieve is stronger than their motive to avoid failure) from

low achievement motivation students (individuals whose motive to avoid failure is stronger than their motive to achieve). Students who scored above 51 on the Mehrabian Measures of Achieving Tendency were identified as having high motivation scores. Students scoring 51 or below were identified as having low motivation scores.

The Mehrabian Measures of
Achieving Tendency

In a 1968 study Albert Mehrabian pointed out the need for a reliable achievement motivation measure as well as the importance of a measure which could be easily administered and scored, and one which would be equally applicable to both sexes. Using the Atkinson (1964) model of achievement motivation, Mehrabian (1968, 1969) developed questionnaire measures of achieving tendency designed to yield greater reliability than had previous measures of achievement motivation (e.g. McClelland, Atkinson, Clark, and Lowell, 1953). The following research studies were conducted by Mehrabian to establish the reliability and validity of the motivation measures (1968, 1969).

Study 1. An initial pool of content items representing different aspects of achieving tendency was identified from other measures of achievement motivation and from the literature. The content groups of items included the following motivation characteristics: tendency to return to incompleted tasks, perseverance, delay gratification, willingness to assume risks, preference for difficult versus easy tasks, fear of failure, desire of stimulation, and desire for closure (i.e., importance of finishing tasks before proceeding to others).

Two hundred fifty-five achievement motivation items were intermixed with items from a social desirability scale developed by Crowne and Marlowe (1960). These items were administered to groups of 125

female and 175 male undergraduate students. Eighty-five items from this questionnaire were selected for retention in subsequent studies.

Study 2. The 85 items from Study 1 and 99 new and revised items from the Crowne and Marlowe (1960) social desirability scale were administered to groups of 126 female and 134 male undergraduates. These items included the following characteristics of motivation: willingness to work hard, impatience, doing more than required, willingness to delay gratification and to sacrifice personal rela- tionships for work success, fear of failure, leadership, ambition, and desire for feedback on performance. From an analysis of these items, 81 of the items were retained for subsequent studies.

Study 3. The 81 items selected in Study 2 were intermixed with items from the Crowne and Marlowe (1960) social desirability scale. This questionnaire was administered to 86 male and 90 female under- graduate students for the purpose of selecting items which would test for achievement motivation.

Study 4. Study 4 was conducted to yield preliminary validity and reliability data for the final 38-item scale. The 38-item Measure of Achieving Tendency along with the Jackson (1967) achievement, Mehrabian (1969) achieving tendency, and Crowne and Marlow (1960) social desirability scales were administered to 76 male and 66 female undergraduates. A Kuder-Richardson formula reliability coefficient of .91 was obtained for the 38-item Mehrabian Achieving Tendency Scale. The 38-item scale evidenced satisfactory convergent validity by correlating .74 with Jackson's Achievement Scale, and .59 with Mehrabian's (1969) Measures of Achieving Tendency for females. All three of these correlation coefficients were significant at the .01 level (Mehrabian and Bank, 1978).

Scale format, scoring, and norms. The 38-item Measure of Achieving Tendency is balanced for response bias. Nineteen items are positively worded and 19 are negatively worded. Subjects respond to the 38-item questionnaire by using a 9-point scale which ranges from +4 (strong agreement) to 0 (neither agreement nor disagreeeement) to -4 (strong disagreement). A total score is computed on the questionnaire by summing responses to the positively worded items and subtracting from this quantity the sum of responses to the negatively worded items. The total score on the Mehrabian Measures has a mean value of 51 and a standard deviation of 35.

The American Institute of Certified Public Accountants Tests

The American Institute of Certified Public Accountants Orientation Test was administered to all students enrolled in the individualized self-paced accounting laboratory class (Method One) and to all students enrolled in the five traditional classes (Method Two) during the first class meeting. The instrument was used to determine the aptitude level (high or low aptitude) of the student. The test measures general and business vocabulary, ability to understand materials in the business field, and the ability to solve business arithmetic problems. The test includes a verbal score, a quantitative score, and a total score (American Institute of Certified Public Accountants Testing Project Office, 1979). Students who received a total score of 35 or below were identified as having low aptitude scores. Students who received a total score of above 35 were identified as having high aptitude scores.

Reliability Data for the American Institute of Certified
  Public Accountants Orientation Test

The reliability data for the American Institute of Certified Public
Accountants Orientation Test were based upon estimates of the internal
consistency of the American Institute of Certified Public Accountants
Orientation Test and was determined by the following method (Engelhart, 1972):

1. The test was split into subtests by placing all odd numbered
    items in one subtest and all even numbered items in another
    subtest.

2. The scores on the two subtests were computed for each
    individual (in the testing sample) and the two sets of
    scores were correlated.

3. The Spearman-Brown formula was used to obtain the
    reliability of the entire test.

The reliability coefficients for the test were as follows: verbal
score --.90; quantitative score --.80; total score --.91 (Traxler, 1959).
These coefficients indicate high reliability. The American Institute of
Certified Public Accountants Testing Project Office reported to the
investigator that no reliability data have been gathered on the American
Institute of Certified Public Accountants Orientation Test since this
1959 study.

Achievement Test, Level 1, Form GS

The American Institute of Certified Public Accountants Achievement
Test, Level 1, Form GS, was administered to all students enrolled in the
individualized self-paced accounting laboratory class (Method One) and to
all students enrolled in the traditional classes (Method Two) after they
completed their study of Chapters 1-14 in the textbook, Accounting
Principles, and did the problems assigned for each chapter. This instrument

tests for an understanding of financial and managerial accounting concepts as presented in elementary accounting courses.

The validation data for the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS (AICPA-AT), were derived from an analysis of AICPA-AT test results in relation to accounting grades and grade point averages provided by nine colleges and universities. The validity coefficients which estimated the relationship between course grades in accounting and AICPA-AT scores ranged from a low of .26 to a high of .83 with a median of .58. The correlation coefficient of .58 was significant at the .01 level. The validity coefficients which estimated the relationship between grade point averages and AICPA-AT scores ranged between .53 and .59 with a median of .43. The correlation coefficient of .43 was significant at the .01 level.

Statement of Hypotheses

The following null hypotheses were tested: (All of the students referred to in these hypotheses are those who were enrolled in the Method One and Method Two groups used in this study).

1. There is no significant difference between the age, sex, college grade point average, aptitude score, achievement motivation score, business courses taken previously on the college level, or work experience in business of those students enrolled in the individualized self-paced accounting laboratory class (Method One) and those enrolled in traditional classes (Method Two).

2. There is no relationship between the students' achievement motivation scores*** and their achievement* in elementary accounting.

3. There is no relationship between the students' achievement motivation scores and their aptitude scores.**

4. There is no relationship between the students' age, sex, and college grade point average and their achievement motivation scores.

5. There is no relationship between the students who have work experience and their achievement motivation scores.

6. There is no relationship between the students who have previously taken courses in business on the college level and their achievement motivation scores.

7. There is no relationship between the students' aptitude scores and their achievement in elementary accounting.

8. There is no relationship between the students' age, sex, and college grade point average and their aptitude scores.

9. There is no relationship between students who have work experience in business and their aptitude scores.

10. There is no relationship between students who have previously taken courses in business and their aptitude scores.

11. There is no relationship between the students' age, sex, and college grade point average and their achievement in elementary accounting.

*Achievement was measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS.
**Aptitude was measured by the American Institute of Certified Public Accountants Orientation Test.
***Achievement Motivation was measured by the Mehrabian Measures of Achieving Tendency.

12. There is no relationship between students who have work experience in business and their achievement in elementary accounting.

13. There is no relationship between students who have previously taken courses in business and their achievement in elementary accounting.

14. There is no significant difference between the achievement motivation scores of students who completed the elementary accounting course and those who withdrew from the course in both Method One and Method Two classes.

15. There is no significant difference between the aptitude scores of students who completed the elementary accounting course and those who withdrew from the course in both Method One and Method Two classes.

16. There is no significant difference between the achievement of students with high achievement motivation and high aptitude scores in the individualized self-paced accounting laboratory accounting class (Method One) and those with high achievement aptitude scores in the traditional classes (Method Two).

17. There is no significant difference between the achievement of students with low achievement motivation and low aptitude scores in the individualized self-paced accounting laboratory class (Method One) and those with low achievement motivation and low aptitude scores in the traditional classes (Method Two).

Research Questions

1. What variable or combination of variables is the best predictor of students' completing the elementary accounting course in the individualized self-paced accounting laboratory class (Method One)?

2. What variable or combination of variables is the best predictor of students' completing the elementary accounting course in the traditional classes (Method Two)?

3. What variable or combination of variables is the best predictor of students' achievement for those students enrolled in the individualized self-paced accounting laboratory class (Method One) and for those students enrolled in the traditional classes (Method Two)?*

*Achievement was measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS.

CHAPTER II

A REVIEW OF RELATED RESEARCH

The review of related research included the following areas:
1) studies comparing the individualized instruction method with the tra-
ditional method of instruction in the teaching of accounting; 2) studies
investigating the effectiveness of self-paced instruction; 3) studies
investigating the validity and reliability of the American Institute of
Certified Public Accountants Achievement Tests; and 4) studies investigating
the effect of achievement motivation on scholastic achievement. This
review of the research found only one study which investigated the
influences of achievement motivation on students' achievement in elemen-
tary accounting.

Individualized Instruction in the Teaching of Accounting

The purpose of Onah's study (1971) was to compare two methods of
teaching the first course in elementary accounting in a community
college; the Audio-Visual-Tutorial (A.V.T.) system was compared to the
conventional (lecture-discussion) method. The total population of 106
accounting students was randomly assigned to two groups: experimental
and control. The experimental group received instruction in the A.V.T.
accounting laboratory using slides and tapes. The control group was
taught by the conventional (lecture-discussion) method. Based on an
analysis of the findings of the study, Onah concluded that the
Audio-Visual-Tutorial method was as effective as the conventional
(lecture-discussion) method.

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In a similar study Carbone (1976) compared the Audio-Visual-Tutorial method with the conventional (lecture-discussion) method in the teaching of a beginning college course in elementary accounting. The Comparative Guidance and Placement Program (CGP) and the American Institute of Certified Public Accountants Orientation Tests were administered to 142 freshman business students. The students were randomly assigned to either the conventional lecture-discussion group or to the audio-visual-tutorial group. A two-part performance test (designed by Carbone for this study) was administered to all students (subjects) at the end of the semester. An analysis of the data revealed that the mean score for subjects (students) in the audio-visual-tutorial group was higher than the mean score for the discussion group, but not statistically significantly higher.

Speer (1972) conducted a study to determine whether differences existed in the achievement of college accounting students who were taught accounting using two different teaching methods: the individualized instruction method and the conventional lecture method. Two sections of elementary accounting were selected to be studied: one section was taught using a conventional lecture method; the other was taught using an individualized instruction method. The individualized instruction method differed from the conventional lecture method in that no class lecture was given by the instructor. The students in the individualized instruction method progressed at their own pace. Both sections used the same textbook and were given the same comprehensive final exam. A comparison of the mean scores in the final exam revealed no significant difference in achievement between students subjected to the individualized instruction method and students subjected to the conventional lecture method.

Brown (1976) compared the effectiveness of teaching elementary accounting to community college students using a traditional approach and an individualized instruction approach. The results of the study indicated that the method of teaching elementary accounting, either traditional or individualized, did not make a significant difference in the achievement of community college accounting students.

Holcomb (1976) studied the effects of individualized instruction using multimedia instructional material and the effects of traditional instruction on average cognitive achievement in an elementary accounting course. The independent variables of ability levels (measured by the Scholastic Aptitude Test), accounting background (high school bookkeeping, prior college accounting, work experience), and age (above or below age 21) were also examined. Holcomb found no significant differences in cognitive achievement due to method of instruction received, ability levels, accounting background, and age.

Individualized Self-Paced Instruction

Reiser and Sullivan (1977) compared the effectiveness of instructor-paced instruction and individualized self-paced instruction in an introductory course in political science. Students were randomly assigned to either a self-paced group or to an instructor-paced group. Students in the self-paced group were allowed to progress through the course at whatever pace they chose, the only restriction being that they had to pass a quiz for one unit before they could proceed to the next unit. For the instructor-paced group, a schedule of dates which determined when the student was required to complete a unit and to take a quiz on that unit was established. Data were collected and analyzed on 1) withdrawal rate; 2) student achievement as measured by the number of

units passed; and 3) attitudes toward the course. The results of the study indicated that there were no significant differences between groups in attitudes or in achievement. However, the number of students who withdrew from the course was significantly higher in the self-paced group than in the instructor-paced group.

In a similar study, Born and Herbert (1974) investigated the effects of the individualized self-paced instruction procedure (Keller Plan) on the performance of students in a beginning psychology course. Based on an analysis of the data collected in the study, Born and Herbert concluded that individualized self-paced instruction procedures were an effective method of instruction.

Research on the American Institute of Certified Public Accountants Achievement Tests

McCormick and Montgomery (1974) conducted a study to determine if the American Institute of Certified Public Accountants Achievement Test was useful in measuring and predicting accounting achievement. The American Institute of Certified Public Accountants Achievement Test, Level 1 (Form DS or ES), was administered to all students entering intermediate accounting classes at Florida Atlantic University between September 1969 and August 1972. Pearson Product-Moment Correlations were obtained estimating the relationship of grade point averages and other tests (Cooperative School and College Ability Test [SCAT] and Cooperative Reading Comprehension Test) to students' scores on the American Institute of Certified Public Accountants Achievement Test (Table 1). Based on an analysis of the data collected in the study, McCormick and Montgomery concluded that the American Institute of Certified Public Accountants Achievement Test made a worthwhile contribution to accounting prognosis programs.

Table 1

Validity of American Institute of Certified Public Accountants
Achievement Test, Level 1, Form DS and ES
(Pearson Product-Moment Correlations)

	FORM DS	FORM ES
	Pearson Product-Moment Correlations	
1. Florida Atlantic University grade point average (group size = 279)	.29**	.59**
2. Cooperative SCAT Test – Quantitative (group size = 246)	.37**	.55**
3. Cooperative SCAT Test – Verbal (group size = 246)	.32**	.61**
4. Cooperative Reading Test Vocabulary (group size = 247)	.26**	.58**
5. Cooperative Reading Test Comprehension (group size = 247)	.32**	.53**

**Significant beyond the .01 level

Buehlmann (1975) investigated the use of the American Institute of Certified Public Accountants Achievement Test, Level 1, as a predictor of success in intermediate accounting. The American Institute of Certified Public Accountants Achievement Test, Level 1, Form ES, was administered on the first day of class to a group of 85 students enrolled in intermediate accounting at Illinois State University. To determine the prediction power of the Level 1 Test, the Pearson Product-Moment Correlation formula was calculated between test scores and subsequent performance (course grades) in intermediate accounting. Based on an analysis of the data, Buehlmann concluded that the Level 1 test scores were good predictors of the grades earned in intermediate accounting (correlation coefficient $r = .50$, probability $p < .01$).

Research on Achievement Motivation and Scholastic Achievement

Reid and Cohen (1973) conducted a study to test the hypothesis that studying for a four-year Bachelor of Education degree in preference to a three-year teacher's certificate was related to achievement motivation. According to Reid and Cohen, the Bachelor of Education degree presumably represented a course of study which was held in high esteem and which presented a greater possibility of professional achievement than did the three-year course of study leading toward a teacher's certificate only. This study involved a group of 115 Bachelor of Education students and 53 certificate students. The two groups of students were matched in terms of sex, academic qualifications, and prerequisite courses. The Mehrabian Measures of Achieving Tendencies were administered to the students in both groups. An analysis of the data revealed that the mean score for the Bachelor of Education students was significantly higher

than it was for the teacher certificate students. The Bachelor of
Education students had significantly higher motivation scores than did
the teaching certificate students.

Weiner, Johnson, and Mehrabian (1968) studied the different degrees
of persistence at incompleted difficult tasks of high and low achievers.
The results indicated that male high achievers exhibited a greater
Zeigarnick effect (percentage of the failed items recalled divided by
the percentage of passed items recalled) than did male low achievers.
Weiner, Johnson, and Mehrabian concluded that high achievers were likely
to be preoccupied with and rehearse those items which they think they
answered incorrectly, whereas the low achievers were likely to avoid
thinking about items which they presumably failed.

Strumpfer (1973) used the Mehrabian Measures of Achievement
Motivation to distinguish high achievers from low achievers. These
measures were also used to predict final course grades for 121 students
enrolled in economics, mercantile law, and accounting at the University
of Port Elizabeth, South Africa. Strumpfer found that the Mehrabian
Measures significantly predicted a final grade for only the accounting
major subsample ($r = .34$, $n = 34$). The Mehrabian Measures had no pre-
dictive validity when used with the economics and mercantile law majors.

CHAPTER 3

PROCEDURES USED IN CONDUCTING THE STUDY

The following procedures were used in this study:

1. Two groups of students enrolled in elementary accounting
   at Clark County Community College, Las Vegas, Nevada,
   during the Fall of 1979 were identified for use in this
   study.

   One group was taught using individualized self-paced
   instruction. This group was labeled Method One. The other
   group was taught using traditional instructional methods.
   This group was labeled Method Two.

2. One hundred elementary accounting students were in the
   Method One group and 150 elementary accounting students were
   in the Method Two group.

3. The course outlines to be used in teaching both groups
   (Methods One and Two) were designed by the researcher
   with the assistance of three experienced elementary
   accounting instructors at Clark County Community College.
   Each of the three instructors involved in the design of the
   course outline was assigned to teach groups using both
   Method One and Method Two.

4. Two weeks prior to the first week of classes in the Fall
   Semester of 1979, the researcher met with the three
   instructors involved. At that time all of the instruc-
   tors received the teaching materials and both oral and

written instructions on how to teach the classes using both Methods One and Two.

5. A class observer was employed to monitor the traditional classes used in this study. To avoid a "Hawthorne" effect the observer assumed a role of a student aide who graded papers. The details of this are on page 28. See Appendix A for the monitoring sheet.

6. During the first class meeting all of the students participating in the study, both those in Method One and Method Two classes, completed a questionnaire indicating their age, sex, college grade point average, business courses taken previously on the college level, and work experience in business (Appendix B). A check was made with the students' permanent records to verify these data.

7. During the first class meeting all of the students participating in the study took the American Institute of Certified Public Accountants Orientation Test and the Mehrabian Measures of Achieving Tendency.

8. Students enrolled in Method One, the individualized self-paced accounting laboratory class, and students enrolled in Method Two, the traditional classes, who received a total score above 35 on the American Institute of Certified Public Accountants Orientation Test, were identified as having high aptitude scores. Students scoring 35 or below were identified as having low aptitude scores.

9. Students participating in the study who received a total score above 51 on the Mehrabian Measures of Achieving Tendency were identified as having high motivation scores; those who scored 51 or below were identified as having low motivation scores. The test author recommended only high and low categories for this test.

10. Students enrolled in the individualized self-paced accounting laboratory class (Method One) attended class on an individual basis. They followed the assignments in the individualized course outline (Appendix E) which called for their reading the assigned chapters in the textbook, Accounting Principles, and working the assigned problems at the end of the chapters. The ALEX modules were available for use by all students.

11. Students enrolled in the traditional classes (Method Two) followed the assignments in their course outlines (Appendix F) as directed by the instructors, which involved reading the assigned chapters in the textbook, Accounting Principles, and working the assigned problems at the end of the chapters. The assigned reading and the assigned problems were explained by the instructors during the regularly scheduled class meetings. The ALEX modules were available for use by all students.

12. After the students in the traditional classes (Method Two) completed their study of Chapters 1-14 in the textbook and completed the assigned problems, they were given the American Institute of Certified Public Accountants

Achievement Test, Level 1, Form GS. This test was admin-
istered to each of the students in the five traditional
classes at the end of the Fall Semester, 1979.

13. After each student in the self-paced accounting laboratory
class (Method One) completed his or her study of chapters
1-14 in the textbook and completed the assigned problems,
he or she was given the American Institute of Certified
Public Accountants Achievement Test, Level 1, Form GS.
This test was administered on an individual basis as each
student completed the assigned work.

Instructors Involved in the Study

Three instructors at Clark County Community College were selected
to participate in the study. The three instructors were assigned to
teach the self-paced accounting laboratory class (Method One) and the
five traditional instruction classes (Method Two). All three of the
instructors had at least three years of experience in teaching elemen-
tary accounting. Each instructor spent at least three hours a week in
the self-paced laboratory class, and an additional three hours a week in
the traditional classes.

Design of the Teaching Methods

The course outline for the individualized self-paced accounting
laboratory class (Method One) and the course outline for the traditional
classes (Method Two) were designed by the researcher with the assistance
of the three elementary accounting instructors at Clark County Community
College who taught the self-paced accounting laboratory class (Method
One) and the five traditional elementary accounting classes (Method Two).
The classroom procedures connected with the use of textbook

materials, reading assignments, ALEX modules, and lectures were described in the course outline. This was done to ensure that methods used were distinctly different and to ensure that no classroom lecture and discussion took place in the individualized self-paced accounting laboratory class (Method One).

Students in the Study

One hundred students were enrolled in an individualized self-paced accounting laboratory class (Method One) and 150 students were enrolled in five traditional instruction classes (Method Two) at Clark County Community College during Fall Semester, 1979. The students involved in the study were allowed to register for either the self-paced accounting laboratory class (Method One) or the traditional-instruction classes (Method Two). The students in the five traditional classes were allowed to choose their class meeting time. Tables 2 and 3 show class schedules, instructors, and enrollments for both groups.

Out of the 100 elementary accounting students enrolled in the self-paced accounting laboratory class (Method One), 17 of the students finished the accounting course and were given the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, at the time they completed the assigned tasks.

Out of the 150 elementary accounting students enrolled in the five traditional classes (Method Two), 78 of the students finished the course and were given the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, at the end of Fall Semester, 1979.

Meetings With Instructors

The following items were discussed during the initial meeting of the researcher and the three accounting instructors:

1. Teaching procedures for Method One and Two were thoroughly described.

Table 2

Class Schedule
Individualized Self-Paced Accounting
Laboratory Class (Method One)
Fall Semester and Spring Semester 1979-80

Times Open	Class Meeting[a]	Enrollment[b]
9:30 a.m. – 2:00 p.m.	Monday – Thursday	100
5:30 p.m. – 9:00 p.m.	Monday – Thursday	
9:00 a.m. – 12:00 p.m.	Saturday	

[a]Three instructors, Robin Nelson, Barbara Morgan, Chris Kelly, provided instructional assistance during all laboratory class time.

[b]The students enrolled in the individualized laboratory class (Method One) chose to attend the laboratory class on an individual basis according to the above schedule.

Table 3

Class Schedules

Traditional Classes (Method Two) Fall Semester 1979

Instructor	Class Section	Time [a]	Class Meeting	Enrollment
Robin Nelson	A	8:00 a.m. – 9:15 a.m.	Monday & Wednesday	27
Barbara Morgan	B	10:50 a.m. – 12:05 p.m.	Monday & Wednesday	24
Chris Kelly	C	6:00 p.m. – 7:15 p.m.	Monday & Wednesday	36
Chris Kelly	D	9:25 a.m. – 10:40 a.m.	Tuesday & Thursday	35
Chris Kelly	E	12:15 p.m. – 1:30 p.m.	Tuesday & Thursday	28

[a] Each class period was 75 minutes.

2. The instructors were briefed on the reliability and vali-
   dity of the Mehrabian Measures of Achieving Tendency, the
   American Institute of Certified Public Accountants
   Orientation Test, and the American Institute of Certified
   Public Accountants Achievement Test, Level 1, Form GS.

3. Instructors were told not to tell students that they were
   involved in a study.

4. Times and dates for administering the Mehrabian Measures
   of Achieving Tendency, the American Institute of Certified
   Public Accountants Orientation Test, and the American
   Institute of Certified Public Accountants Achievement
   Test, Level 1, Form GS, were given to each instructor.

Meeting with Observer

The following items were discussed during the initial meeting of the
researcher and the class observer:

1. Procedures for administering the Mehrabian Measures of
   Achieving Tendency, the American Institute of Certified
   Public Accountants Orientation Test, and the American
   Institute of Certified Public Accountants Achievement
   Test, Level 1, Form GS, were given to the observer. The
   observer administered all the tests given as part of this
   study.

2. The observer was briefed on the procedures for completing
   the checklist used in monitoring the five traditional
   classes (Appendix A).

3. The observer was told not to tell students that they were
   involved in the study.

4. The observer was asked to check with each instructor during the week to be sure that no students enrolled in the individualized self-paced accounting laboratory attended a traditional class.

5. The observer was asked to assume the role of a typical student aid grading papers so as to not be seen recording classroom activities. This was done to avoid the "Hawthorne" effect that might have occurred if the students knew their classroom activities were being observed and recorded.

Class Observations

The observer was assigned to monitor the five traditional classes (Method Two) and to complete a checklist (Appendix A) during each class period indicating the amount of time (divided into one-quarter-minute segments) that the instructor spent on the following class activities: 1) taking roll and making announcements (non-instructional activities); 2) giving lectures; 3) answering questions from students; 4) asking questions of the students; 5) observing students working the assigned problems; 6) counseling the students; and 7) administering tests. It was not necessary to assign the class observer to monitor the classroom activities in the individualized self-paced accounting laboratory class (Method One). The three instructors in the individualized self-paced accounting laboratory class conducted the class using an individualized format with no class lectures or discussion.

Personal Data Acquisition

During the first class meeting each student enrolled in the individualized self-paced accounting laboratory class (Method One) and the

five traditional classes (Method Two) were asked to complete a question-
naire indicating his/her age, sex, college grade point average, courses
in business previously taken on the college level, and work experience
in business (Appendix B). Permanent records of students were used to
find any data not supplied by the student and to check the accuracy of
the data given by the students.

Conversations With Instructors

At least twice per week during Fall Semester, 1979, the researcher
met with the three elementary accounting instructors involved in the
study. During each meeting the instructors discussed the teaching pro-
cedures used in the five traditional classes and those used in the self-
paced accounting laboratory class. Emphasis was made on the instruc-
tor's following the course outlines closely so as to ensure that there
was no group instruction given to the individualized self-paced
accounting laboratory class (Method One).

Notes to the Student

Two "Notes to the Student" were attached to the tests given
(Appendix C and D). The purpose of these notes was to inform the students
that the tests, the American Institute of Certified Public Accountants
Orientation Test, the Mehrabian Measures of Achievement Tendency, and
the American Institute of Certified Public Accountants Achievement Test,
would not be used to determine final grades in the course.

Grading Tests

The Mehrabian Measures of Achieving Tendency, administered to all students in the self-paced accounting laboratory class (Method One) and the five traditional classes (Method Two), were scored by the class observer.

The American Institute of Certified Public Accountants Orientation Tests and Achievement Tests, Level 1, Form GS, were scored by the American Institute of Certified Public Accountants Testing Project Office.

Table 4 shows test scores on the Mehrabian Measures of Achieving Tendency. Table 5 shows scores made on the American Institute of Certified Public Accountants Orientation Test and Table 6 gives a composite picture of the relative position of each method on aptitude and motivation measures.

Table 4

Mehrabian Measures of Achieving Tendency Test Scores

	Class Size	Number of Students With High Motivation Scores	Number of Students With Low Motivation Scores
Method One (Self-Paced Laboratory)	100	71 (71%)	29 (29%)
Method Two (Traditional Classes)	150	101 (67%)	49 (33%)

Table 5

American Institute of Certified Public Accountants
Orientation (Aptitude) Test Scores

	Class Size	Number of Students With High Aptitude Scores	Number of Students With Low Aptitude Scores
Method One (Self-Paced Laboratory)	100	45 (45%)	55 (55%)
Method Two (Traditional Classes)	150	61 (41%)	89 (59%)

Table 6

Aptitude and Motivation Scores

	Class Size	High Aptitude[a] High Motivation[b]	High Aptitude[a] Low Motivation[b]	Low Aptitude[a] High Motivation[b]	Low Aptitude[b] Low Motivation
Method One (Self-Paced Laboratory)	100	38 (38%)	7 (7%)	33 (33%)	22 (22%)
Method Two (Traditional Classes)	150	45 (30%)	16 (10.7%)	56 (37.3%)	33 (22%)

[a]Aptitude measured by the American Institute of Certified Public Accountants Orientation Test.

[b]Motivation measured by the Mehrabian Measures of Achieving Tendency.

CHAPTER IV

ANALYSIS OF DATA

The Statistical Package for the Social Sciences (SPSS) computer program was used to analyze the data. The specific programs used from this system were the t test procedure to determine the preexperimental equivalence of students in Method One and Method Two classes, the Pearson Product-Moment Correlation procedure to determine relationships between variables, and the Analysis of Variance (ANOVA) procedure to determine if significant differences existed between students enrolled in the individualized self-paced accounting laboratory class (Method One) and those students enrolled in the traditional classes (Method Two). The Multiple Regression procedure was also used to predict success of students in both groups.

The hypotheses were tested at the .05 level and at the .01 level.

> It has been conventional in behavioral science
> research work to use the .05 and .01 levels of
> significance. Of course, if a statistical test
> yields a result which is significant at the .01
> level, it is also significant at the .05 level.
> (Popham, p. 53)

Preexperimental Equivalence

Hypothesis 1

T tests were used to determine the preexperimental equivalence of students enrolled in the individualized self-paced accounting laboratory class (Method One) and those enrolled in the traditional classes (Method

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Two). Preexperimental equivalence was determined on each of the
following variables: aptitude, achievement motivation, sex, age,
college grade point average, courses in business previously taken, and
previous work experience in business.

Aptitude

A t test was used to compare the aptitude scores of students
enrolled in the self-paced accounting laboratory class (Method One) with
the aptitude scores of students enrolled in the traditional classes
(Method Two). The American Institute of Certified Public Accountants
Orientation Test was used to measure aptitude. The t test showed that
there was no significant difference between the aptitude scores of stu-
dents enrolled in Method One and those students enrolled in Method Two
(Table 7).

Achievement Motivation

A t test was used to determine if there was a significant dif-
ference between the achievement motivation scores, as measured by the
Mehrabian Measures of Achieving Tendency, of students enrolled in the
individualized self-paced accounting laboratory class (Method One) and
those students enrolled in the traditional classes (Method Two). The
t test showed there was no significant difference between the achieve-
ment motivation scores of students enrolled in Method One and students
enrolled in Method Two (Table 8).

Age

A t test showed that there was a significant difference between the
ages of students enrolled in the self-paced accounting laboratory class
(Method One) and those students enrolled in the traditional classes
(Method Two). The average age of students enrolled in the traditional

Table 7

Preexperimental Equivalence--Comparison of
AICPA Aptitude Test Scores of Students in
Methods One and Two Classes

	Mean Aptitude Test Scores [a]	Standard Deviation	Class Size
Method One	33.3400	19.217	100
Method Two	29.1000	16.575	150
		$\underline{t}$ value 1.80*	

[a]Measured by the American Institute of Certified Public
Accountants Orientation Test.

*$\underline{t}$ value 1.80 is not sufficient for significance at the .05
level.

Table 8

Preexperimental Equivalence--Comparison of
Motivation Test Scores of Students in
Methods One and Two Classes

	Mean Motivation[a] Test Scores	Standard Deviation	Class Size
Method One	68.3000	32.699	100
Method Two	67.1867	33.670	150
		t value .26	

[a]Motivation was measured by the Mehrabian Measures of
Achieving Tendency.

*t value .26 is not sufficient for significance at the .05
level.

classes (Method Two) was 26.78 while the average age of students enrolled in the self-paced accounting laboratory class was 30.14 (Table 9).

Sex

A t test showed that there was no significant difference between the number of males and females enrolled in the self-paced accounting laboratory class (Method One) and the number of males and females enrolled in the traditional classes (Method Two). Approximately 61 percent of the students in the individualized self-paced accounting laboratory class (Method One) was female while 62 percent of the students in the traditional classes (Method Two) was female (Table 10).

College Grade Point Average

A t test comparing the college grade point averages of students enrolled in the self-paced accounting laboratory class (Method One) with the college grade point average of students enrolled in the traditional classes (Method Two) showed that there was no significant difference between the two groups. Only 68 students in the individualized self-paced accounting laboratory class (Method One) and 92 students in the traditional classes (Method Two) were used to determine the preexperimental equivalence of the two groups. The remaining 90 students involved in the study were new students; they did not have college grade point averages (Table 11).

Work Experience in Business

A t test showed that there was no significant difference between the number of students in the individualized self-paced accounting

Table 9

Preexperimental Equivalence--
Comparison of Age of Students in
Methods One and Two Classes

	Mean Age	Standard Deviation	Class Size
Method One	30.1400	10.300	100
Method Two	26.7867	9.520	150
		t value 2.60*	

*t value 2.60 is sufficient for significance at the .01 level.

Table 10

Preexperimental Equivalence--
Comparison of Sex of Students in
Methods One and Two Classes

	Mean Sex[a]	Standard Deviation	Class Size
Method One	.6100	.490	100
Method Two	.6267	.485	150
		$\underline{t}$ value .26*	

[a]Female Students were given the value of 1 and male
students were given the value of 0.

*$\underline{t}$ value .26 is not sufficient for significance at the .05
level.

Table 11

Preexperimental Equivalence--
Comparison of College Grade Point Averages of Students in
Methods One and Two Classes

	Mean Grade Point Average[a]	Standard Deviation	Number Having College Grade Point Averages
Method One	3.163	.687	68
Method Two	3.141	.591	92
		$\underline{t}$ value .21*	

[a]College grade point averages can range from 0 to 4.0.

*$\underline{t}$ value .21 is not sufficient for significance at the .05 level.

laboratory class (Method One) who had work experience in business
and the number of students in the traditional classes (Method Two)
who had work experience in business. Approximately 58 percent of
the students in the individualized self-paced accounting laboratory
class had work experience while 60 percent of the students in the tradi-
tional classes had work experience (Table 12).

Business Courses Previously Taken

A t test showed that there was no significant difference between
the number of students in the individualized self-paced accounting
laboratory class (Method One) who had previously taken business courses
on the college level and the number of students in the traditional
classes (Method Two) who had previously taken business courses on the
college level. Approximately 51 percent of the students enrolled in the
individualized self-paced accounting laboratory class (Method One) had
previously taken business courses while 58 percent of the students
enrolled in the traditional classes (Method Two) had previously taken
business courses (Table 13).

Estimates of Reliability

The Kuder-Richardson Formula 21 was used to estimate the reliabil-
ity of the American Institute of Certified Public Accountants
Achievement Test, Level 1, Form GS, the Mehrabian Measures of Achieving
Tendency, and the American Institute of Certified Public Accountants
Orientation Test (Table 14). The Kuder-Richardson Formula 21 assumes
that all items on the test are of equal difficulty. This formula repre-
sents the average correlation obtained from all possible split-half

Table 12

Preexperimental Equivalence--
Comparison of Students' Work Experience in Business in
Methods One and Two Classes

	Mean Work Experience [a]	Standard Deviation	Class Size
Method One	.5800	.496	100
Method Two	.6067	.490	150
		$\underline{t}$ value .42*	

[a] Students who indicated work experience in business on the student questionnaire were given the value of 1. Students who indicated no work experience were given the value of 0.

*$\underline{t}$ value .42 is not sufficient for significance at the .05 level.

Table 13

Preexperimental Equivalence--
Comparison of Business Courses Previously Taken by Students in
Methods One and Two Classes

	Mean (Business Courses[a] Previously Taken)	Standard Deviation	Class Size
Method One	.5100	.502	100
Method Two	.5800	.495	150
		t value 1.09*	

[a]Students who had previously taken courses in business were given the value of 1. Students who had not previously taken courses in business were given the value of 0.

*t value 1.09 is not sufficient for significance at the .05 level.

reliability estimates. The Kuder-Richardson Formula 21 is as follows:

$$r_{xx} = \frac{n}{n-1} \quad [1 - \overline{X} \, (\frac{n - \overline{X}}{nSx^2})]$$

where:
$$n = \text{number of items in test}$$
$$Sx^2 = \text{variance of the total test}$$
$$X = \text{mean of the total test}$$

Table 14

Kuder-Richardson Formula 21 Correlations

Test	Correlations	Number of Cases
American Institute of Certified Public Accountants Achievement Test	.83*	95
American Institute of Certified Public Accountants Orientation Test	.94*	250
The Mehrabian Measures of Achieving Tendency	.98*	250

*Significant at .01 level.

Classroom Activities

During each traditional class period the observer assigned to moni-
tor each class completed a checklist (Appendix A) indicating the
amount of class time the instructor spent on the following activities:
1) taking roll and making announcements (non-instructional activities);
2) giving lectures; 3) answering questions from students; 4) asking
questions of the students; 5) observing students working the assigned
problems (instructor observation); 6) counseling the students; and
7) administering tests. A summary of these activities is presented in
Table 15. The purpose of this procedure was to determine if the Method
Two instuctors were using the traditional instructional method.

Table 15

Mean Time Spent in Classroom Activities
In Traditional Instruction Classes (Method Two)

Class Sections[a]	Non-instructional Activity (Minutes)	Lecture (Minutes)	Students ask. & ans. Questions (Minutes)	Instructor Asking Questions (Minutes)	Instructor Observation (Minutes)	Individual Student Counseling (Minutes)	Test (Minutes)
Section A	7	39	3	1	6	3	16
Section B	5	34	5	4	13	2	12
Section C	3	29	4	6	17	1	15
Section D	4	39	4	6	11	2	9
Section E	5	39	5	3	11	2	10

[a]Each section was 75 minutes in length.

A summary of the data from the checklist revealed the following:

1. More class time was spent on class lectures in Sections A, D, and E than was spent in Sections B and C.

2. Students in all sections spent about the same amount of time asking questions of the instructor.

3. The instructors in Sections B and C spent more time observing students working class assigned problems (Instructor Observation) than did those instructors in Sections A, D, and E.

4. More time was spent in Sections C and D with the instructor asking questions of the students than was spent by those instructors teaching Sections A, B, and E.

<div align="center">Pearson Product-Moment Correlations</div>

For each of the following hypotheses the Pearson Product-Moment Correlation Formula was used to test the degree of relationship between the variables.

Hypothesis 2

There was no significant relationship between students' achievement motivation as measured by the Mehrabian Measures of Achieving Tendency and their achievement in elementary accounting as measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS. By correlating students' achievement motivation scores and students' achievement scores, a Pearson Product-Moment correlation value of .175 was obtained (Table 16).

Hypothesis 3

There was a significant relationship between students' achievement motivation as measured by the Mehrabian Measures of Achieving Tendency

Table 16

Pearson Product-Moment Correlations of Achievement Motivation With Aptitude, Age, Sex, Work Experience, Previously Taken Business Courses, Grade Point Average, and Achievement for Students in Methods One and Two Classes

	APT[a] n = 250	MOT[b] n = 250	AGE n = 250	SEX n = 250	EXP[c] n = 250	BUS[d] n = 250	GPA[e] n = 160	ACH[f] n = 95
MOT[b]	.246*	1.000	.127	.008	.186	.017	.255**	.175

[a] APT = the aptitude variable as measured by the American Institute of Certified Public Accountants Orientation Test.

[b] MOT = the motivation variable as measured by the Mehrabian Measures of Achieving Tendency.

[c] EXP = work experience in business.

[d] BUS = courses in business previously taken on the college level.

[e] GPA = college grade point average.

[f] ACH = the achievement variable as measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS.

*Significant at the .05 level.

**Significant at the .01 level.

and students' aptitude scores as measured by the American Institute of
Certified Public Accountants Orientation Test. A correlation of .246
was determined to be significant at the .05 level (Table 16).

Hypothesis 4

There was no significant relationship between students' achievement
motivation as measured by the Mehrabian Measures of Achieving Tendency
and students' age and sex. By correlating achievement motivation with
students' age, a correlation of .127 was obtained. By correlating
achievement motivation with the sex of the student, a correlation of
.008 was obtained (Table 16).

There was a significant relationship between students' achievement
motivation as measured by the Mehrabian Measures of Achieving Tendency
and students' college grade point average. A Pearson Product-Moment
correlation coefficient of .255 was found to be significant at the .01
level (Table 16).

Hypothesis 5

There was no significant relationship between students' achievement
motivation as measured by the Mehrabian Measures of Achieving Tendency
and students who had work experience in business. A correlation of
achievement motivation and work experience yielded an association of
.186 (Table 16).

Hypothesis 6

There was no significant relationship between students' achievement
motivation as measured by the Mehrabian Measures of Achieving Tendency
and students who have previously taken courses in business on the
college level. A correlation of achievement motivation and business
courses previously taken yielded an association of .017 (Table 16).

Hypothesis 7

There was a significant relationship between the students' aptitude
scores as measured by the American Institute of Certified Public
Accountants Orientation Test and their achievement in elementary
accounting as measured by the American Institute of Certified Public
Accountants Achievement Test, Level 1, Form GS. A Pearson
Product-Moment correlation coefficient of .618 was found to be signifi-
cant at the .01 level (Table 17).

Hypothesis 8

There was no significant relationship between students' aptitude
as measured by the American Institute of Certified Public Accountants
Orientation Test and the sex of the student. By correlating students'
aptitude scores and the sex of the student, a negative relationship of
.192 was obtained (Table 17).

There was a significant relationship between students' aptitude as
measured by the American Institute of Certified Public Accountants
Orientation Test and students' age. A Pearson Product-Moment correla-
tion coefficient of .441 was found to be significant at the .01 level
(Table 17).

There was no significant relationship between students' aptitude as
measured by the American Institute of Certified Public Accountants
Orientation Test and students' college grade point average. By corre-
lating students' aptitude scores and students' college grade point
averages, an association of .181 was obtained (Table 17).

Hypothesis 9

There was a significant relationship between students' aptitude as
measured by the American Institute of Certified Public Accountants

Table 17

Pearson Product-Moment Correlations of Aptitude With Achievement Motivation,
Age, Sex, Work Experience, Previously Taken Business Courses, Grade Point Averages,
And Achievement for Students in Methods One and Two Classes

	APT[a] n = 250	MOT[b] n = 250	AGE n = 250	SEX n = 250	EXP[c] n = 250	BUS[d] n = 250	GPA[e] n = 160	ACH[f] n = 95
APT[a]	1.000	.246*	.441**	-.192	.246*	.064	.181	.618**

[a]APT = the aptitude variable as measured by the American Institute of Certified
Public Accountants Orientation Test.

[b]MOT = the motivation variable as measured by the Mehrabian Measures of Achieving
Tendency.

[c]EXP = work experience in business.

[d]BUS = courses in business previously taken.

[e]GPA = college grade point average.

[f]ACH = the achievement variable as measured by the American Institute of Certified
Public Accountants Achievement Test, Level 1, Form GS.

*Significant at the .05 level.

**Significant at the .01 level.

Orientation Test and students who had work experience in business. A Pearson Product-Moment correlation coefficient of .246 was found to be significant at the .05 level (Table 17).

Hypothesis 10

There was no significant relationship between students' aptitude as measured by the American Institute of Certified Public Accountants Orientation Test and students who had previously taken courses in business on the college level. A Pearson Product-Moment correlation coefficient of .064 was obtained (Table 17).

Hypothesis 11

There was no significant relationship between students' achievement in elementary accounting as measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, and students' age. A correlation of achievement and students' age yielded an association of .189 (Table 18).

There was no significant relationship between students' achievement in elementary accounting as measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, and students' sex. By correlating achievement in elementary accounting and sex, an association of .123 was obtained (Table 18).

There was a significant relationship between students' achievement in elementary accounting as measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, and students' college grade point averages. By correlating achievement in elementary accounting and college grade point averages, an association of .302 was obtained (Table 18).

Table 18

Pearson Product-Moment Correlations of Achievement with Aptitude, Motivation, Age, Sex, Work Experience, Previously Taken Business Courses, And Grade Point Averages for Students in Methods One and Two Classes

	APT^a n = 250	MOT^b n = 250	AGE n = 250	SEX n = 250	EXP^c n = 250	BUS^d n = 250	GPA^e n = 59	ACH^f n = 95
ACH^f	.618*	.175	.189	.123	.257*	.069	.302*	1.000

^{a}APT = the aptitude variable as measured by the American Institute of Certified Public Accountants Orientation Test.

^{b}MOT = the motivation variable as measured by the Mehrabian Measures of Achieving Tendency.

^{c}EXP = work experience in business.

^{d}BUS = courses in business previously taken.

^{e}GPA = college grade point average.

^{f}ACH = the achievement variable as measured by the American Institute of Certified Public Accountants Achievement Test – Level 1, Form GS.

*Significant at the .01 level.

Hypothesis 12

There was a significant relationship between students' achievement in elementary accounting as measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, and students who had work experience in business. A Pearson Product-Moment correlation coefficient of .257 was found to be significant at the .01 level (Table 18).

Hypothesis 13

There was no significant relationship between students' achievement in elementary accounting as measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS, and students who had previously taken courses in business on the college level. A Pearson Product-Moment correlation coefficient of .06 was obtained (Table 18).

Further Analysis

There was a significant relationship between students' achievement in elementary accounting and students who had work experience in business (Hypothesis 12). A t test was used to determine if there was a significant difference between the achievement scores of students who had work experience in business and those who had no work experience. A comparison of the two groups showed that the mean achievement scores of students who had work experience in business was significantly higher than the mean achievement score of students who had no work experience. A t value of 3.85 was found to be significant at the .01 level (Table 19).

There was a significant relationship between students' aptitude scores and students who had work experience in business (Hypothesis 9). A t test was used to determine if there was a significant difference between the aptitude scores of students who had work experience in business

Table 19

Comparison of Achievement Scores With Work Experience
In Business for Students in Methods One and Two Classes

	Mean Achievement Score [a]	Standard Deviation	Number of Cases
Group 1 [b] (Work Experience)	9.2	5.7	59
Group 2 [c] (No Work Experience)	5.0	5.9	36
		$\underline{t}$ value 3.85*	

[a] Achievement was measured by the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS.

[b] Students who indicated work experience in business on the student questionnaire.

[c] Students who indicated no work experience in business on the student questionnaire.

*$\underline{t}$ value 3.85 is sufficient for significance at the .01 level.

and those who had no work experience. A comparison of the two groups
showed that the mean aptitude score of students who had work experience in
business was significantly higher than the mean aptitude scores for stu-
dents who had no work experience. A t value of 4.25 was found to be
significant at the .01 level (Table 20).

There was a significant relationship between students' aptitude
scores and students' age (Hypothesis 8). A comparison was made of the
aptitude scores of students who were under 30 years of age with the
aptitude scores of students who were 30 years and older. A t test was
used to determine if there was a significant difference between the
aptitude scores of the two groups. A t value of 6.66 was found to be
significant at the .01 level (Table 21).

Hypothesis 14

The t test was used to determine if there was a significant dif-
ference between the achievement motivation scores of students who
completed the elementary accounting course and the motivation scores of
students who withdrew from the course. A comparison was made between
the achievement motivation scores of students who completed the individ-
ualized self-paced accounting laboratory class (Method One) and those
who withdrew from the course. The mean achievement motivation score of
students who completed the elementary accounting course was signifi-
cantly higher than the mean achievement motivation score of students who
withdrew from the course. A t value of 2.99 was found to be significant
at the .01 level (Table 22).

A comparison was also made of the achievement motivation scores of
students enrolled in the traditional classes (Method Two) who completed
the elementary accounting course with the motivation scores of students

Table 20

Comparison of Aptitude Scores With Work Experience
In Business for Students in Methods One and Two Classes

	Mean Aptitude Scores [a]	Standard Deviation	Number of Cases
Group 1 [b] (Work Experience)	34.52	17.154	150
Group 2 [c] (No Work Experience)	25.14	17.300	100
		t value 4.25*	

[a] Aptitude was measured by the American Institute of Certified Public Accountants Orientation Test.

[b] Students who indicated work experience in business on the student questionnaire.

[c] Students who indicated no work experience in business on the student questionnaire.

*t value 4.25 is sufficient for significance at the .01 level.

Table 21

Comparison of Aptitude Scores With Age of Students
In Method One and Two Classes

	Mean Aptitude Score [a]	Standard Deviation	Number of Cases
Group 1 [b] (Under 30 years of Age)	25.4	16.039	158
Group 2 [c] (Over 30 years of Age)	39.8	16.970	92
		t value 6.66*	

[a]Aptitude was measured by the American Institute of
   Certified Public Accountants Orientation Test.

[b]Mean aptitude score of students under 30 years of age.

[c]Mean aptitude score of students 30 years and older.

*t value 6.66 is sufficient for significance at the .01
   level.

Table 22

Comparison of Achievement Motivation Scores of Students Who
Completed the Individualized Self-Paced Accounting Laboratory
Class (Method One) With Those Who Withdrew From the Class

	Mean Achievement Motivation Score [a]	Standard Deviation	Number of Cases
Group 1 [b] (Students Completing the Course)	87.70	29.72	17
Group 2 [c] (Students not Completing the Course)	64.32	32.00	83
		t value 2.99*	

[a] Achievement Motivation was measured by the Mehrabian
    Measures of Achieving Tendency.

[b] Those students who completed the individualized self-paced accounting
    laboratory class (Method One).

[c] Those students who withdrew from the individualized self-paced
    accounting laboratory class (Method One).

*t value 2.99 is sufficient for significance at the .01 level.

who withdrew from the course. The mean achievement motivation score of students who completed the elementary accounting course in the traditional classes (Method Two) was higher than the mean achievement motivation score of students who withdrew from the course but was not significantly higher (Table 23).

Hypothesis 15

There was a significant difference between the aptitude scores of students who completed the individualized self-paced accounting laboratory class (Method One) and the aptitude scores of those students who withdrew from the course. A t value of 4.50 was found to be significant at the .01 level (Table 24).

A t test comparing the aptitude scores of students enrolled in the traditional classes (Method Two) with those who finished the course and those who withdrew also showed a significant difference. A t value of 2.83 was found to be significant at the .01 level (Table 25).

Analysis of Covariance

The statistical technique of a one-way analysis of covariance was used to test the following hypotheses:

16. There is no significant difference between the achievement of students with high achievement motivation and high aptitude scores in the individualized self-paced accounting laboratory class (Method One) and those with high achievement motivation and high aptitude scores in the traditional classes (Method Two).

17. There is no significant difference between the achievement of students with low achievement motivation and low aptitude scores in the individualized self-paced accounting laboratory

Table 23

Comparison of Achievement Motivation Scores of Students Who
Completed the Traditional Course (Method Two) With
Those Who Withdrew From the Course

	Mean Achievement [a] Motivation Scores	Standard Deviation	Number of Cases
Group 1 [b] (Students Completing the Course)	67.01	33.40	78
Group 2 [c] (Students not Completing the Course)	66.65	32.80	72
		t value .06*	

[a] Achievement Motivation was measured by the Mehrabian Measures of Achieving Tendency.

[b] Those students who completed the elementary accounting course.

[c] Those students who withdrew from the elementary accounting course.

*t value .06 is not sufficient for significance at the .05 level.

Table 24

Comparison of Aptitude Scores for Students
Who Completed the Self-Paced Course and Those Who Withdrew
From the Course (Method One)

	Mean [a] Aptitude Score	Standard Deviation	Number of Cases
Group 1 [b]	50.94	13.11	17
Group 2 [c]	32.08	26.08	83
		t value 4.50*	

[a] Aptitude was measured by the American Institute of Certified Public Accountants Orientation Test.

[b] Those students who completed the elementary accounting course.

[c] Those students who withdrew from the elementary accounting course.

*t value 4.50 is sufficient for significance at the .01 level.

Table 25

Comparison of Aptitude Scores for Students
Who Completed the Traditional Course and Those Who Withdrew
From the Course (Method Two)

	Mean Aptitude Score [a]	Standard Deviation	Number of Cases
Group 1 [b]	33.29	20.01	78
Group 2 [c]	25.37	14.55	72
		t value 2.83*	

[a] Aptitude was measured by the American Institute of Certified Public Accountants Orientation Test.

[b] Those students who completed the traditional elementary accounting course.

[c] Those students who withdrew from the traditional elementary accounting course.

*t value 2.83 is sufficient for significance at the .01 level.

class (Method One) and those with low achievement motivation
and low aptitude scores in the traditional classes (Method Two).
According to Popham:

> This powerful technique (analysis of covariance)
> allows the researcher to statistically equate the
> the independent variable group with respect to one
> or more variables which are relevant to the dependent
> variable (Popham, p. 53).

The computation results in an F ratio which, when considered with
the appropriate number of degrees of freedom, will permit the
researcher to reject the null hypotheses at the preestablished signifi-
cance level.

Hypothesis 16

Using an analysis of covariance, the achievement scores of 16
students with high motivation and high aptitude scores in the individ-
ualized self-paced accounting laboratory class (Method One) were
compared with the achievement scores for a random sample of 16 students
with high motivation and high aptitude scores in the traditional classes
(Method Two). The computed F ratio, 1.537, was not sufficient for signi-
ficance at the .05 level. No significant difference was found between
the achievement scores of students with high achievement motivation and
high aptitude scores in Method One and those with high motivation and
high aptitude scores in Method Two (Table 26).

Hypothesis 17

It was not possible for the researcher to test Hypothesis 17. Only
one student with a low motivation and a low aptitude score enrolled in
the individualized self-paced accounting laboratory class (Method One)
completed the elementary accounting course.

Table 26

Results of a One-Way Analysis of Covariance -- Comparison of
Achievement Scores With High Aptitude and High Motivation Scores
Between Method One and Two Classes (Hypothesis 16)

Source of Variance[a]	Degrees of Freedom	Sum of Squares	Mean Sum of Squares	F Ratio
Between	1	52.881	52.881	1.537*
Within	29	997.901	34.410	

[a]Achievement was measured by the American Institute of Certified
Public Accountants Achievement Test, Level 1, Form GS.
Aptitude was measured by the American Institute of Certified
Public Accountants Orientation Test and achievement motiva-
tion was measured by the Mehrabian Measures of Achieving
Tendency.

*F Ratio 1.537 is not sufficient for significance at the
.05 level.

Completion Rates

Out of the 100 elementary accounting students enrolled in the individualized self-paced accounting laboratory class (Method One), 17 completed the course. Research on individualized self-paced accounting laboratory classes has not established a definite completion rate expectation but generally this rate has been found to be low. The rate of 17 percent cannot be considered to be any lower than that which would generally be expected in self-paced community college elementary accounting classes. For a breakdown by aptitude and achievement motivation scores see Table 27.

Out of the 150 elementary accounting students enrolled in the five traditional classes (Method Two), 78 completed the course. This completion rate is generally comparable to reported completion rates for community college students in elementary accounting classes taught using traditional teaching methods. For a breakdown by aptitude and achievement motivation scores see Table 28.

Table 27

Breakdown of Completion Rates in the
Individualized Self-Paced Laboratory Class (Method One)
By Aptitude and Motivation

Aptitude and Motivation Categories	Number Who Completed the Course	Number Who Withdrew From the Course
High Aptitude and High Achievement Motivation Students (n = 38)	16 (42.00%)	22 (58.00%)
Low Aptitude and Low Achievement Motivation Students (n = 22)	1 (0.45%)	21 (99.55%)
High Aptitude and Low Achievement Motivation Students (n = 7)	0 (0.00%)	7 (100%)
Low Aptitude and High Achievement Motivation Students (n = 33)	0 (0.00%)	33. (100%)
Total (n = 100)	17 (17.00%)	83 (83.00%)

Table 28

Breakdown of Course Completion Rates in the
Traditional Classes (Method Two)
By Aptitude and Motivation

Aptitude and Motivation Categories	Number Who Completed the Course		Number Who Withdrew From the Course	
High Aptitude and High Achievement Motivation Students (n = 45)	28	(68.0%)	17	(38.0%)
Low Aptitude and Low Achievement Motivation Students (n = 33)	14	(42.0%)	19	(58.0%)
High Aptitude and Low Achievement Motivation Students (n = 16)	10	(62.5%)	6	(37.5%)
Low Aptitude and High Achievement Motivation Students (n = 56)	26	(46.4%)	30	(53.6%)
Total (n = 150)	78	(52.0%)	73	(48.0%)

Predictors of Success

One of the purposes of this study was to find ways to predict the success of elementary accounting students enrolled in individualized self-paced laboratory and traditional accounting courses. In this study success in elementary accounting was defined in the following two ways: 1) students' completing the elementary accounting course; and 2) students' scores on the American Institute of Certified Public Accountants Achievement Test, Level 1, Form GS.

The multiple regression procedure was used to determine what variables or combination of variables could be used to predict the success of elementary accounting students enrolled in the individualized self-paced accounting laboratory class (Method One) and of those enrolled in the traditional classes (Method Two). The most important uses of this technique are: 1) to find the prediction equation and evaluate its prediction accuracy; and 2) to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables (Nie, Hull, Jenkens, Steinbaums, and Bent, 1975).

Research Question 1

What variable or combination of variables is the best predictor of students' completing the elementary accounting course in the individualized self-paced accounting laboratory class (Method One)? College grade point average was omitted as a variable in the multiple regression analysis because many students were freshmen and did not have college grade point averages.

The multiple regression procedure was used to evaluate what variable or combination of variables was the best predictor of students'

completing the elementary accounting course in the individualized self-paced accounting laboratory class (Method One). The F statistic in Table 29 tests the significance of the predictive function of the independent variables: aptitude, motivation, age, sex, work experience in business and courses in business previously taken on the college level. Table 29 also shows the predictive contribution of each independent variable.

The multiple regression analysis revealed that aptitude and age were the best predictors of students' completing the elementary accounting course in the individualized self-paced accounting laboratory class (Method One). The regression equation used in the analysis for predicting students' completion in elementary accounting explained only 24.8 percent of the variance.

Research Question 2

What variable or combination of variables is the best predictor of students' completing the elementary accounting course in the traditional classes (Method Two)?

The multiple regression procedure was used to evaluate what variable or combination of variables was the best predictor of students completing the elementary accounting course. The F statistic in Table 30 tests the significance of the predictive function of the independent variables: aptitude, motivation, age, sex, work experience in business and business courses previously taken on the college level. Table 30 also shows the predictive contribution of each independent variable.

The multiple regression analysis revealed that aptitude was the best predictor of students completing the elementary accounting course

Table 29

Test for Significant Contribution of Aptitude, Motivation,
Age, Sex, Work Experience and Business Courses Previously Taken
Predicting Students' Completing the Elementary
Accounting Course (Method One)

Independent Variable	F	R^2
Aptitude [a]	14.33*	.1299
Achievement Motivation [b]	3.79	.0380
Age	8.36*	.0801
Sex	.01	.0001
Work Experience in Business	.06	.0007
Courses in Business Previously Taken on the College Level	.00	.0000

[a] Aptitude was measured by the American Institute of Certified Public
Accountants Orientation Test.

[b] Achievement Motivation was measured by the Mehrabian Measures of
Achieving Tendency.

*Significant at the .01 level.

Table 30

Test for Significant Contribution of Aptitude, Motivation,
Age, Sex, Work Experience and Business Courses Previously Taken
Predicting Students' Completing the Elementary
Accounting Course (Method Two)

Independent Variable	F	R^2
Aptitude [a]	4.84*	.0316
Achievement Motivation [b]	.03	.0002
Age	1.24	.0083
Sex	3.45	.0220
Work Experience in Business	3.48	.0230
Courses in Business Previously Taken on the College Level	.50	.0030

[a]Aptitude was measured by the American Institute of Certified Public
Accountants Orientation Test.

[b]Achievement Motivation was measured by the Mehrabian Measures of
Achieving Tendency.

*Significant at the .05 level.

in the traditional classes (Method Two). The regression equation used
in the analysis of predicting students' completion in elementary
accounting explained only about 9 percent of the variance.

Research Question 3

What variable or combination of variables is the best predictor of
students' achievement scores in elementary accounting in the individ-
ualized self-paced accounting laboratory class (Method One) and in the
traditional classes (Method Two)?

The multiple regression procedure was used to evaluate what variable
or combination of variables was the best predictor of students' achieve-
ment scores in elementary accounting. The American Institute of Certified
Public Accountants Achievement Test, Level 1, Form GS, was used to
measure the achievement of elementary accounting students. The F sta-
tistic in Table 31 tests the significance of the predictive function of
the independent variables: aptitude, motivation, age, sex, work
experience in business and business courses previously taken on the
college level. The multiple regression analysis revealed that aptitude
and work experience in business were the best predictors of students'
achievement scores in elementary accounting. The regression equation
used in the analysis of predicting students' achievement scores in ele-
mentary accounting explained about 53 percent of the variance.

Table 31

Test for Significant Contribution of Aptitude, Motivation,
Age, Sex, Work Experience and Business Courses Previously Taken
Predicting Students' Achievement Scores in
Method One and Two Classes

Independent Variable	F	R^2
Aptitude[a]	57.60*	.3826
Achievement Motivation[b]	2.90	.0307
Age	3.40	.0350
Sex	1.40	.0153
Work Experience in Business	6.60*	.0663
Courses in Business Previously Taken on the College Level	.33	.0036

[a] Aptitude was measured by the American Institute of Certified Public
Accountants Orientation Test.

[b] Achievement Motivation was measured by the Mehrabian Measures of
Achieving Tendency.

*Significant at the .01 level.

Summary of Findings

A significant relationship was found between students' aptitude as measured by the American Institute of Certified Public Accountants Orientation Test and students' age. In the individualized self-paced accounting laboratory class (Method One) the average age of the students (30.14) was higher than the average age of the students (26.78) in the traditional classes (Method Two). The average aptitude score of students in the laboratory class was higher than the average aptitude score of students in the traditional classes, but was not significantly higher. Out of 100 students originally enrolled in the self-paced accounting laboratory class, only 17 completed the course. Out of the 150 students originally enrolled in the traditional classes, 78 completed the course. It is interesting to note that the average age of those who completed the course in the individualized self-paced accounting laboratory class (Method One) was 38.2. The average age of those students who completed the traditional course (Method Two) was 27.8. Tables 32 and 33 show a summary of the preexperimental equivalences and correlations of the variables used in the study.

Age along with aptitude was a significant predictor of success in the individualized self-paced accounting laboratory class (Method One), but this combination was not a predictor of success in the traditional classes (Method Two).

There was a significant relationship for all students between aptitude and work experience in business. Students who had work experience in business had higher average aptitude scores than did those students who had no work experience in business. A significant relationship

Table 32

Summary
Preexperimental Equivalences—Comparison of Seven Variables
In Methods One and Two Classes

Hypothesis	Variable	t value	Significance Level
1 (preexperimental equivalence in Method One and Method Two Classes)	Aptitude	1.80	Not sufficient for significance at the .05 level.
1 (preexperimental equivalence in Method One and Method Two Classes)	Achievement Motivation	.26	Not sufficient for significance at the .05 level.
1 (preexperimental equivalence in Method One and Method Two Classes)	Age	2.60	Sufficient for significance at the .01 level.
1 (preexperimental equivalence in Method One and Method Two Classes)	Sex	.26	Not sufficient for significance at the .05 level.
1 (preexperimental equivalence in Method One and Method Two Classes)	College Grade Point Average	.21	Not sufficient for significance at the .05 level.
1 (preexperimental equivalence in Method One and Method Two Classes)	Work Experience in Business	.42	Not sufficient for significance at the .05 level.
1 (preexperimental equivalence in Method One and Method Two Classes)	Business Courses Previously Taken	1.09	Not sufficient for significance at the .05 level.

Table 33

Summary
Pearson Product-Moment Correlations of Selected Variables
In Methods One and Two Classes

Hypothesis		Correlation Coefficients	Significance Level
2	Correlation of Motivation and Achievement	.175	Not Sufficient for Significance at the .05 level.
3	Correlation of Motivation and Aptitude	.246	Sufficient for Significance at the .05 level.
4	Correlation of Motivation with Age	.127	Not Sufficient for Significance at the .05 level.
4	Correlation of Motivation with Sex	.008	Not Sufficient for Significance at the .05 level.
4	Correlation of Motivation with GPA	.255	Sufficient for Significance at the .01 level.
5	Correlation of Motivation with Work Experience	.186	Not sufficient for Significance at the .01 level.
6	Correlation of Motivation with Business Courses	.017	Not sufficient for Significance at the .01 level.

Table 33 (continued)

Summary
Pearson Product-Moment Correlations of Selected Variables
In Methods One and Two Classes

Hypothesis		Correlation Coefficients	Significance Level
7	Correlation of Aptitude and Achievement	.618	Sufficient for Significance at the .01 level.
8	Correlation of Aptitude with Age	.441	Sufficient for Significance at the .01 level.
8	Correlations of Aptitude with Sex	-.192	Not sufficient for Significance at the .05 level.
8	Correlations of Aptitude GPA	.181	Not sufficient for Significance at the .05 level.
9	Correlation of Aptitude with Work Experience	.246	Sufficient for Significance at the .05 level.
10	Correlation of Aptitude with Business Courses	.064	Not sufficient for Significance at the .05 level.

Table 33 (continued)

Summary
Pearson Product-Moment Correlations of Selected Variables
In Methods One and Two Classes

Hypothesis		Correlation Coefficients	Significance Level
11	Correlation of Achievement with Age	.189	Not sufficient for Significance at the .05 level.
11	Correlation of Achievement with Sex	.123	Not sufficient for Significance at the .05 level.
11	Correlation of Achievement with GPA	.302	Sufficient for Significance at the .01 level.
12	Correlation of Achievement with Work Experience	.257	Sufficient for Significance at the .01 level.
13	Correlation of Achievement with Business Courses	.060	Not sufficient for Significance at the .05 level.

was found between students' achievement as measured by the American
Institute of Certified Public Accountants Achievement Test, Level 1,
Form GS, and work experience in business. Students who had work
experience in business had higher achievement scores than did those who
had no work experience. It seems to be apparent that work experience in
business contributes to the learning of elementary accounting and to the
aptitude for learning elementary accounting.

There was a significant relationship between students' aptitude and
students' achievement motivation. In the individualized self-paced
accounting laboratory class (Method One), sixteen of the seventeen stu-
dents who completed the course had high aptitude and high achievement
motivation scores. Only one student with a low aptitude and a low
motivation score completed the elementary accounting course in the
individualized self-paced accounting laboratory class. Students with
with low aptitude and low motivation scores, high aptitude and low
motivation scores, and low aptitude and high motivation scores had
difficulty completing the elementary accounting course in the indivi-
dualized self-paced accounting laboratory class. However, those stu-
dents in the traditional classes who had low aptitude and low
motivation, high aptitude and low motivation, and low aptitude and high
motivation scores completed the elementary accounting course.

A significant relationship was found between students' aptitude
scores and their achievement in elementary accounting. In the multiple
regression analysis, aptitude was found to be the best predictor of
students' achievement in elementary accounting.

A significant relationship was found between students' aptitude scores and students' completing the elementary accounting course. In the multiple regression analysis, aptitude was found to be the best predictor of students' completing the elementary accounting course. It was found that the aptitude of students who completed the elementary accounting course was higher than the aptitude scores of students who withdrew from the course. This was to be expected because the aptitude test measured those aptitudes which would be expected to select high achieving students. Table 34 is a summary of aptitude and achievement motivation scores for those who completed the elementary accounting course and those who withdrew in both Methods One and Two classes.

There was no significant relationship between students' motivation scores and students' achievement. However, the achievement motivation scores of students who completed the elementary accounting course when compared with those students who withdrew from the course were found to be higher. This, too, would be expected to occur if the motivation test was a good one. Motivation to achieve would tend to predict those students who would complete the course regardless of their achievement level. The multiple regression analysis showed that the motivation variable alone was not a strong predictor of success in elementary accounting. When motivation and aptitude test scores were combined, this combination did prove to be a predictor of success in elementary accounting.

No significant difference was found between the achievement of students with high achievement motivation and high aptitude scores in the individualized self-paced accounting laboratory class and those with a high motivation and high aptitude scores in the traditional classes.

Table 34

Summary

Comparison of Aptitude and Achievement Motivation Scores for Students
Who Completed and Those Who Withdrew From the Elementary Accounting Course in
Methods One and Two Classes

Hypothesis	Variable	t Value	Significance Level
14	Comparison of Achievement Motivation scores of students who completed and those who withdrew from Method One	2.99	Sufficient for significance at the .01 level.
14	Comparison of Achievement Motivation scores of students who completed and those who withdrew from Method Two	.06	Not sufficient for significance at the .05 level.
15	Comparison of Aptitude scores of students who completed and those who withdrew from Method One	4.50	Sufficient for significance at the .01 level.
15	Comparison of Aptitude scores of students who completed and those who withdrew from Method Two	2.83	Sufficient for significance at the .01 level.

Those students who had high motivation and high aptitude seemed to per-
form well regardless of whether they were in a structured traditional
class setting or in an individualized self-paced accounting laboratory
setting. Table 35 is a summary of the comparison of achievement scores
between Methods One and Two Classes.

Table 35

Summary

Comparison of Achievement Scores
Between Methods One and Two Classes

Hypothesis	Variable	F Ratio	Significance Level
16	Comparison of Achievement of students with high motivation and high aptitude scores between Method One and Two Classes	1.537	Not sufficient for significance at the .05 level
17	Comparison of Achievement of students with low motivation and low aptitude scores between Method One and Two Classes	(It was not possible for the researcher to test this hypothesis because of the high attrition of low aptitude and low motivation students in Method One).	

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The problem of high withdrawal rates of students enrolled in individualized self-paced courses was investigated in this study. The withdrawal rate was much higher for students in the individualized self-paced accounting laboratory class than it was for students enrolled in the traditional classes. Further research should be done to investigate ways of improving the retention rate of students in individualized self-paced accounting laboratory classes.

In the study older students (over 30 years of age) chose to enroll in the individualized self-paced accounting laboratory class (Method One). It is possible that older students (over 30 years of age), because of work obligations, need a flexible class schedule as was provided in the self-paced accounting laboratory class. Further research should be done to investigate why older students (over 30 years of age) choose to enroll in individualized self-paced accounting laboratory classes.

Aptitude was found to be the best single predictor of students' completing the elementary accounting course. Aptitude was also found to be the best single predictor of student achievement in elementary accounting. Aptitude test scores should be used for counseling students into either traditional or self-paced accounting classes.

Students with low aptitude and low motivation scores, high aptitude and low motivation scores, and low aptitude and high motivation scores in the individualized self-paced accounting laboratory class did not

complete the elementary accounting course. Sixteen of the seventeen students in the individualized self-paced laboratory class who completed the course had both high motivation and high aptitude test scores. Students with high aptitude and low motivation scores, low aptitude and high motivation scores, and low motivation and low aptitude scores in the traditional classes completed the elementary accounting course. If individualized self-paced accounting laboratories are to be used in teaching elementary accounting, counselors should attempt to select students who score high in both motivation and aptitude for such a laboratory class. Students with low aptitude scores who choose to enroll in individualized self-paced accounting laboratory classes should be provided with remedial work in order to raise their expected achievement level. The instructor of an individualized self-paced accounting laboratory class should provide ways to motivate the students in order to encourage their completing the course.

The independent variables used in the regression equation for predicting students' completion of elementary accounting in the individualized self-paced accounting laboratory class explained only 24.8 percent of the variance. The independent variables used in the regression equation for predicting students' completion of elementary accounting in the traditional classes explained only 9 percent of the variance. Further studies should be done to determine additional predictors of success for accounting students.

Work experience in business and courses in business previously taken on the college level were studied in order to determine if these factors could be used to predict achievement scores for elementary accounting

students. Work experience was found to be a significant predictor of student achievement. However, courses in business previously taken did not contribute significantly to students' learning elementary accounting. The multiple regression analysis showed that work experience contributed to aptitude for learning elementary accounting. However, no firm recommendation can be made covering work experience as a single factor in predicting achievement in elementary accounting.

APPENDIX A

CHECKLIST FOR OBSERVER

CHECKLIST FOR OBSERVER

INSTRUCTOR: _____

HOUR: _____ DATE: _____

Minutes	NONINSTRUCTIONAL ACTIVITY	LECTURE	STUDENTS ASKS ?'S	INSTRUCTOR ASKS ?'S	INSTRUCTOR OBSERVATION	INDIVIDUAL STUDENT COUNSELING	TEST
0-6							
7-12							
13-18							
19-24							
25-30							
31-36							

APPENDIX B

STUDENT QUESTIONNAIRE

STUDENT QUESTIONNAIRE

Instructor _____   Hour _____

Name _____   Sex _____

Age _____

College Grade Point Average _____

Courses in Business Previously Taken _____
on the College Level   _____

Work Experience in Business _____
                                         _____

APPENDIX C

NOTE TO THE STUDENT

<u>NOTE TO THE STUDENT*</u>

In an effort to improve instruction at Clark County Community College, the Accounting Department will be administering the Mehrabian Questionnaire and the AICPA Orientation Test. The Mehrabian Questionnaire will measure individual differences in achieving tendency. The AICPA Orientation Test will measure general and business vocabulary, ability to understand materials in the business field, and the ability to solve business arithmetic problems. These two instruments will be given to accounting students enrolled in the traditional classes and in the accounting laboratory class. YOUR SCORES ON THESE TESTS WILL NOT AFFECT YOUR FINAL COURSE GRADE IN ACCOUNTING.

*This note was attached to the Mehrabian Measures of Achieving Tendency and the American Institute of Certified Public Accountants Orientation Test given the first day of class.

APPENDIX D

NOTE TO THE STUDENT

NOTE TO THE STUDENT*

     In an effort to improve instruction at Clark County Community College, the Accounting Department will be administering the AICPA Achievement Test at the conclusion of your study of elementary accounting. This test measures your understanding of elementary accounting concepts. YOUR SCORES ON THIS TEST WILL NOT AFFECT YOUR FINAL COURSE GRADE IN ACCOUNTING.

*This note was attached to the AICPA Achievement Test given as each student completed course requirements.

APPENDIX E

COURSE OUTLINE FOR METHOD ONE

CLARK COUNTY COMMUNITY COLLEGE
COURSE OUTLINE

ACC 151--Elementary Accounting 1
(Individualized Self-Paced Class)

CREDIT: 3 Semester Hours

REQUIRED TEXT: Accounting Principles, Twelfth Edition
                     Niswonger and Fess

OTHER REQUIRED   Working papers for Chapters 1-14 to accompany the text.
MATERIAL: Ruler, No. 2 pencil and pencil sharpener, and an eraser.

OBJECTIVES:

The student will:

    1. Be familiar with specialized terminology used in business and
        accounting.
    2. Be able to record business transactions in journal form.
    3. Be able to post journal entries to ledger accounts.
    4. Be able to make adjusting, closing, and reversing entries.
    5. Be able to prepare a trial balance, balance sheet, income
        statement, and capital statement.
    6. Be able to account for accounts payable and accounts receivable
        using special journals.
    7. Be able to account for notes receivable and payable and interest
        thereon.
    8. Be able to account for merchandise inventories.
    9. Be able to account for accruals and deferrals.
   10. Be able to compute depreciations and account for depreciation
        expense.
   11. Be able to reconcile a bank statement.
   12. Be familiar with internal control systems and the voucher system.
   13. Be able to compute payrolls and account for payroll deductions
        and payments.
   14. Be familiar with data processing as applied to accounting.
   15. Be able to account for partnerships, especially formation, income
        distributions and liquidation procedures.
   16. Demonstrate his/her competence with satisfactory performance on
        application of problem tests.

PROCEDURE:

Elementary Accounting is individualized to your learning pace through the
use of ALEX Modules (film strips and tapes) and multiple channel projectors.
With this approach, you have the option of working entirely at your own
pace completing the assignments as quickly as you choose, or you may work
on a structured day-to-day pace; following the suggested time table for
completion of the course in a regular semester.

The ALEX Modules and projectors will be stationed in Room C-1050. Your instructor or an assistant will be available to accounting students during the following hours:

Monday through Thursday	9:30 a.m. – 1:30 p.m.
Monday through Thursday	5:30 p.m. – 9:00 p.m.
Friday	Closed
Saturday	9:00 a.m. – 12:00 p.m.

This will be an open lab. <u>Come anytime.</u> You may work as many problems or view as many modules as you like on any given day. Try to do as much of your work as possible in the laboratory. You will be working at a disadvantage if you do all of your work outside of the accounting lab without the aid of an instructor.

Before proceeding with the chapters, familiarize yourself with the mechanics of the equipment you will be using. Then follow this general procedure for each chapter:

1. Review the Study Guide Outline in the packet for the respective chapter.

2. Read and study the chapter.

3. Use the ALEX Modules assigned for the chapter.

4. Answer the questions at the end of the chapter. Check your answers with the solution manuals available in the lab.

5. Review anything you do not completely understand with your instructor.

6. Complete the assigned problems for the chapter.

7. Self check your completed problems with the instructor's solution manual. If you have any questions, check with the instructor.

8. Have the instructor record your progress.

9. Proceed to the next chapter.

COURSE OUTLINE

Week #1
A. AICPA Orientation Test
B. Achievement Motivation Test
C. Student Questionnaire
D. Introduction to Accounting 151
E. Chapter 1--Accounting Principles
            and Practices
F. Exercises: 1-1, 1-2, 1-3, 1-4, 1-5, 1-6
G. Problem Assignments: 1-1A, 1-2A, 1-3A, 1-4A

Week #2
A. Chapter 2--The Accounting Cycle
B. Exercises: 2-1, 2-2, 2-3, 2-4, 2-5, 2-6
C. Problems: 2-1A, 2-2A, 2-3A, 2-4A, 2-5A, 2-6A

Week #3
A. Chapter 3--Completion of the Accounting Cycle
B. Exercises: 3-1, 3-2, 3-3, 3-4, 3-5, 3-6
C. Problem Assignments: 3-1A, 3-2A, 3-3A, 3-4A,
                          3-5A

Week #4
A. Chapter 3 (continued)
B. Review for test 1 (Chapters 1-3)

Week #5
A. Test 1 on Chapters 1-3
B. Chapter 4--Accounting for Merchandise
C. Exercises: 4-1, 4-2, 4-3, 4-4, 4-5, 4-6
D. Problem Assignments: 4-1A, 4-2A, 4-3A, 4-4A,
                          4-5A, 4-6A

Week #6
A. Chapter 5--Periodic Reporting
B. Exercises: 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7
C. Problem Assignments: 5-1A, 5-2A, 5-3A, 5-4A,
                          5-5A,

Week #7
A. Chapter 6--Receivables and Payables
B. Exercises: 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-7,
              6-8
C. Problem Assignments: 6-1A, 6-2A, 6-3A, 6-4A,
                          6-5A, 6-6A

Week #8
A. Chapter 6 (continued)
B. Review for Test 2 (chapters 4, 5, & 6)
C. Test on Chapters 4, 5, & 6

Week #9
A. Chapter 7--Merchandise Inventory
B. Exercises: 7-1, 7-2, 7-3, 7-4, 7-5, 7-6
C. Problem Assignments: 7-1A, 7-2A, 7-3a, 7-4A, 7-5A, 7-6A
D. Chapter 8--Deferrals and Accruals
E. Exercises: 8-1, 8-2, 8-3, 8-4, 8-5, 8-6
F. Problem Assignments: 8-1A, 8-2A, 8-3A, 8-4A, 8-5A, 8-6A, 8-7A

Week #10
A. Chapter 9--Plant Assets and Intangible Assets
B. Exercises: 9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 9-8, 9-9
C. Problem Assignments: 9-1A, 9-2A, 9-3A, 9-4A, 9-5A, 9-6A, 9-7A

Week #11
A. Chapter 10--Systems and Controls
B. Exercises: 9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 9-8, 9-9
C. Problem Assignments: 10-1A, 10-2A, 10-3A, 10-4A, 10-5A, 10-6A
D. Review for Test 3 (Chapters 7, 8, 9, 10)

Week #12
A. Test on Chapters 7, 8, 9, 10
B. Chapter 11--Payroll Systems
C. Exercises: 11-1, 11-2, 11-3, 11-4, 11-5, 11-6
D. Problem Assignments: 11-1A, 11-2A, 11-3A, 11-4A, 11-5A

Week #13
A. Chapter 12--Systems Design and Automated Data Processing
B. Exercises: 12-1, 12-2, 12-3, 12-4, 12-5, 12-6
C. Problem Assignments: 12-1A, 12-2A, 12-3A, 12-4A, 12-5A, 12-6A
D. Chapter 13--Concepts and Principles
E. Exercises: 13-1, 13-2, 13-3, 13-4,13-5, 13-6, 13-7, 13-8
F. Problem Assignments: 13-1A, 13-2A, 13-3A, 13-4A, 13-5A, 13-6A

Week #14
A. Chapter 14--Formation, Income, Division and Liquidation
B. Problems: 14-1A, 14-2A, 14-3A, 14-4A, 14-5A

Week #15
A. Review for Test 4 (Chapters 11, 12, 13, & 14)
B. Test 4
C. AICPA Achievement Test

APPENDIX F

OUTLINE FOR METHOD TWO

CLARK COUNTY COMMUNITY COLLEGE
COURSE OUTLINE

ACC 151--Elementary Accounting 1

CREDIT: 3 Semester Hours

REQUIRED TEXT: Accounting Principles, Twelfth Edition
                     Niswonger and Fess

OTHER REQUIRED   Working papers for Chapters 1-14 to accompany the text.
MATERIAL: Ruler, No. 2 pencil and pencil sharpener, and an eraser.

OBJECTIVES:

The student will:

1. Be familiar with specialized terminology used in business and
    accounting.
2. Be able to record business transactions in journal form.
3. Be able to post journal entries to ledger accounts.
4. Be able to make adjusting, closing, and reversing entries.
5. Be able to prepare a trial balance, balance sheet, income
    statement, and capital statement.
6. Be able to account for accounts payable and accounts receivable
    using special journals.
7. Be able to account for notes receivable and payable and interest
    thereon.
8. Be able to account for merchandise inventories.
9. Be able to account for accruals and deferrals.
10. Be able to compute depreciations and account for depreciation
    expense.
11. Be able to reconcile a bank statement.
12. Be familiar with internal control systems and the voucher system.
13. Be able to compute payrolls and account for payroll deductions and
    payments.
14. Be familiar with data processing as applied to accounting.
15. Be able to account for partnerships, especially formation, income
    distributions and liquidation procedures.
16. Demonstrate his/her competence with satisfactory performance on
    application of problem tests.

PROCEDURE:

If, after reading and studying the chapter, some areas are not clear, it is
advisable to view the ALEX Modules. These film strips are available in the
library or in the accounting lab, Room C-1050. Do the assigned problems and
correct them yourself, using the solution manuals which are also available in
the library or the accounting lab. Make sure that you understand the problem

COURSE OUTLINE (continued)

as you correct it. Homework should be completed and corrected when
handed in or it will be returned to you with NO-CREDIT. We will review
individual problems in class as needed.

COURSE OUTLINE

Week #1	A. AICPA Orientation Test
	B. Achievement Motivation Test
	C. Student Questionnaire
	D. Introduction to Accounting 151
	E. Chapter 1—Accounting Principles and Practices
	F. Exercises: 1-1, 1-2, 1-3, 1-4, 1-5, 1-6
	G. Problem Assignments: 1-1A, 1-2A, 1-3A, 1-4A
Week #2	A. Chapter 2—The Accounting Cycle
	B. Exercises: 2-1, 2-2, 2-3, 2-4, 2-5, 2-6
	C. Problems: 2-1A, 2-2A, 2-3A, 2-4A, 2-5A, 2-6A
Week #3	A. Chapter 3—Completion of the Accounting Cycle
	B. Exercises: 3-1, 3-2, 3-3, 3-4, 3-5, 3-6
	C. Problem Assignments: 3-1A, 3-2A, 3-3A, 3-4A, 3-5A
Week #4	A. Chapter 3 (continued)
	B. Review for test 1 (Chapters 1-3)
Week #5	A. Test 1 on Chapters 1-3
	B. Chapter 4—Accounting for Merchandise
	C. Exercises: 4-1, 4-2, 4-3, 4-4, 4-5, 4-6
	D. Problem Assignments: 4-1A, 4-2A, 4-3A, 4-4A, 4-5A, 4-6A
Week #6	A. Chapter 5—Periodic Reporting
	B. Exercises: 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7
	C. Problem Assignments: 5-1A, 5-2A, 5-3A, 5-4A, 5-5A,
Week #7	A. Chapter 6—Receivables and Payables
	B. Exercises: 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-7, 6-8
	C. Problem Assignments: 6-1A, 6-2A, 6-3A, 6-4A, 6-5A, 6-6A
Week #8	A. Chapter 6 (continued)
	B. Review for Test 2 (chapters 4, 5, & 6)
	C. Test on Chapters 4, 5, & 6

Week #9
    A. Chapter 7--Merchandise Inventory
    B. Exercises: 7-1, 7-2, 7-3, 7-4, 7-5, 7-6
    C. Problem Assignments: 7-1A, 7-2A, 7-3a, 7-4A, 7-5A, 7-6A
    D. Chapter 8--Deferrals and Accruals
    E. Exercises: 8-1, 8-2, 8-3, 8-4, 8-5, 8-6
    F. Problem Assignments: 8-1A, 8-2A, 8-3A, 8-4A, 8-5A, 8-6A, 8-7A

Week #10
    A. Chapter 9--Plant Assets and Intangible Assets
    B. Exercises: 9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 9-8, 9-9
    C. Problem Assignments: 9-1A, 9-2A, 9-3A, 9-4A, 9-5A, 9-6A, 9-7A

Week #11
    A. Chapter 10--Systems and Controls
    B. Exercises: 9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 9-8, 9-9
    C. Problem Assignments: 10-1A, 10-2A, 10-3A, 10-4A, 10-5A, 10-6A
    D. Review for Test 3 (Chapters 7, 8, 9, 10)

Week #12
    A. Test on Chapters 7, 8, 9, 10
    B. Chapter 11--Payroll Systems
    C. Exercises: 11-1, 11-2, 11-3, 11-4, 11-5, 11-6
    D. Problem Assignments: 11-1A, 11-2A, 11-3A, 11-4A, 11-5A

Week #13
    A. Chapter 12--Systems Design and Automated Data Processing
    B. Exercises: 12-1, 12-2, 12-3, 12-4, 12-5, 12-6
    C. Problem Assignments: 12-1A, 12-2A, 12-3A, 12-4A, 12-5A, 12-6A
    D. Chapter 13--Concepts and Principles
    E. Exercises: 13-1, 13-2, 13-3, 13-4,13-5, 13-6, 13-7, 13-8
    F. Problem Assignments: 13-1A, 13-2A, 13-3A, 13-4A, 13-5A, 13-6A

Week #14
    A. Chapter 14--Formation, Income, Division and Liquidation
    B. Problems: 14-1A, 14-2A, 14-3A, 14-4A, 14-5A

Week #15
    A. Review for Test 4 (Chapters 11, 12, 13, & 14)
    B. Test 4
    C. AICPA Achievement Test

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BIOGRAPHICAL SKETCH

Barbara Saturday Echord was born in Adel, Georgia, October 13, 1951.
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In 1977 Barbara entered the University of Florida in the Doctor of
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in score and quality, as a dissertation for the degree of Doctor of Philosophy.

Glenna D. Carr, Chairman
Professor, Subject Specialization
Teacher Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in score and quality, as a dissertation for the degree of Doctor of Philosophy.
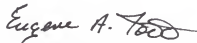
Arthur J. Lewis
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and Support

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in score and quality, as a dissertation for the degree of Doctor of Philosophy.

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August 1980

Dean, Graduate School